Innovation Development and Management – Think Local, Act Global

AGENDA

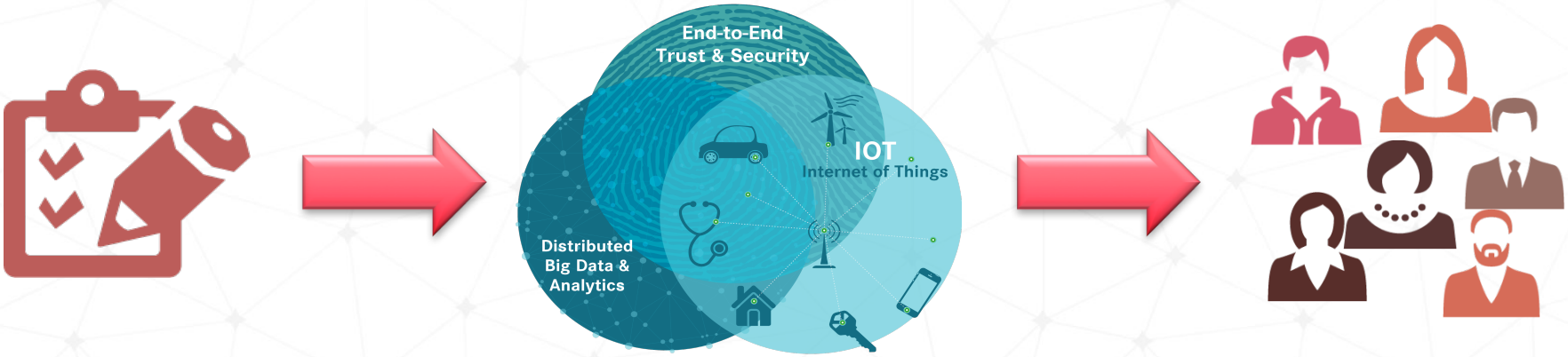
- **Internet2 Collaborative Innovation Community**, Florence Hudson, Internet2
- **GÉANT's Open Call**, Annabel Grant, GÉANT

Internet2 Collaborative Innovation Community

- Evolution of the Collaborative Innovation Community (CINC)
- CINC Activities
  - E2ET&S for IoT Workshop
  - IoT Sandbox
  - Smart Campus Initiative
  - Healthcare/Life Sciences Strategy Development and SME Interviews
  - CINC Up calls
- Campus/Community Collaborative Innovation Days

Collaborative Innovation Program

Established three new Internet2 Collaborative Innovation Working Groups During Global Summit 2015 based on March 2015 Member Survey



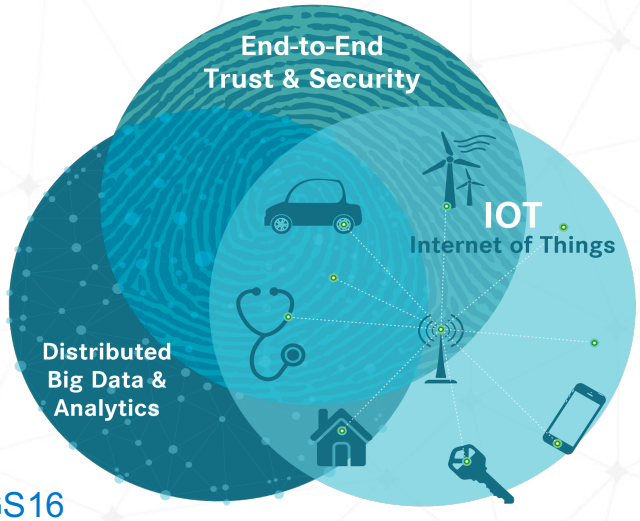
Innovation Working Groups include University, Industry, Affiliate members, Regional and International Networks

*As of May 2016

Internet2 Collaborative Innovation Program Focus Areas developed by members

E2E Trust & Security:

- End to End Trust and Security for IoT
- TIPPSS – Trust, Identity, Privacy, Protection, Safety, Security
- SDP (Software Defined Perimeter), Network Segmentation



Distributed Big Data & Analytics:

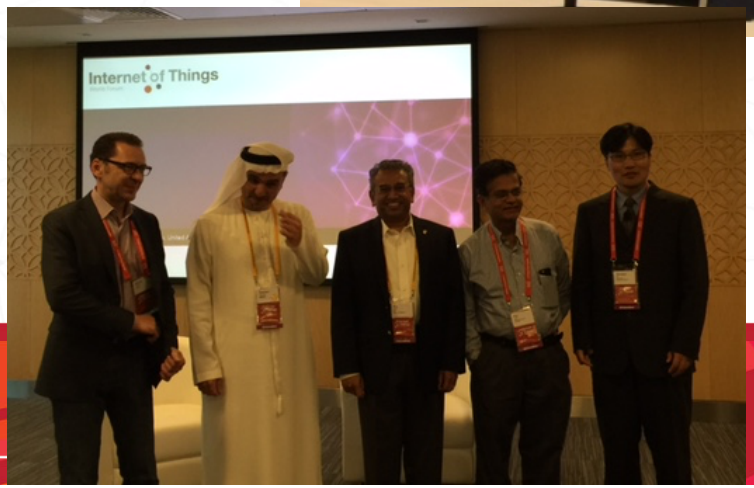
- Genomics
- Digital Humanities
- Smart Campus/Smart Cities

Internet of Things:

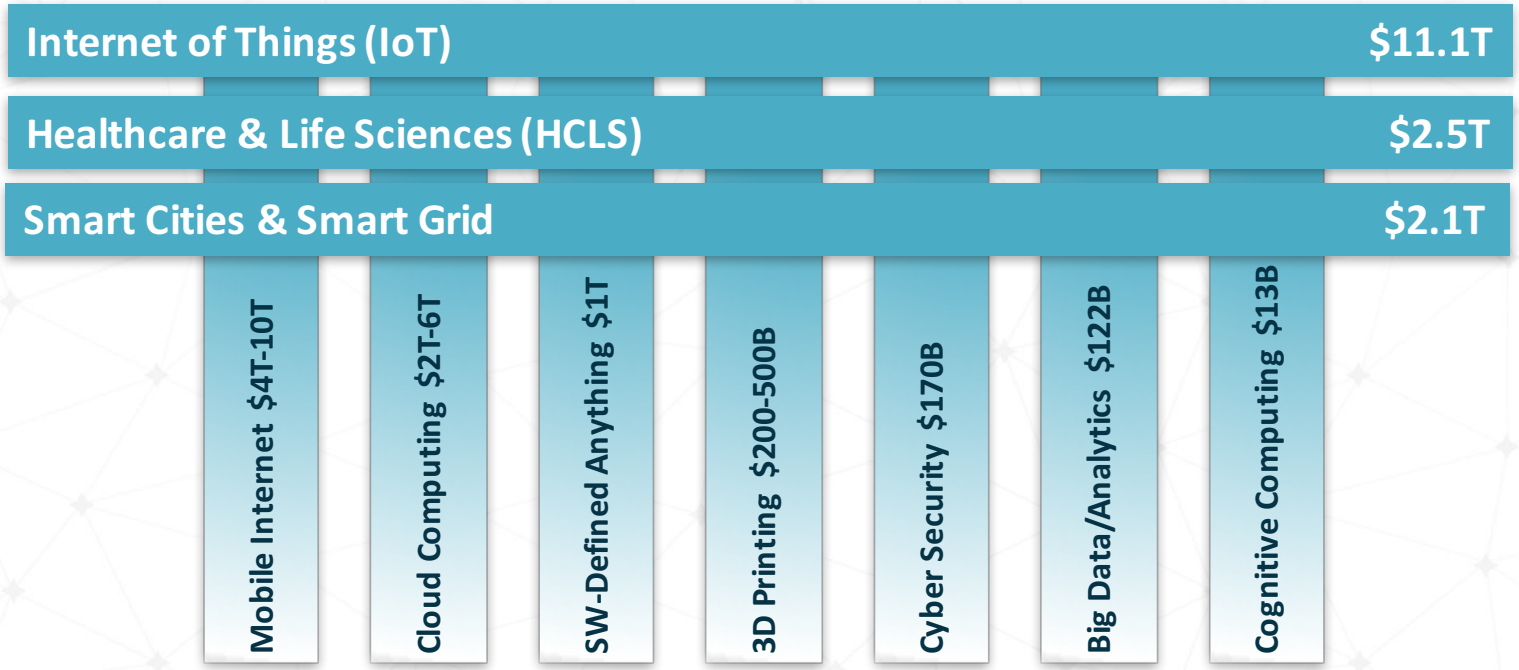
- IoT Sandbox
- Smart Grid Testbed
- Smart Campus/Smart Cities

Join a working group: http://bit.ly/CINCGS16

CINC Community Members Participating in IoT Activities Around the World



Key Information and Communications Technology Trends for Research & Education provide a strategic view



Economic value includes revenues, cost reductions & service improvements achieved

Sources: Internet2 CINO analysis; BizTech; Deloitte; Consultantcy.uk; Forbes; Markets and Markets; McKinsey; US Department of Agriculture, Economic Research Services.

E2ET&S for IoT developed into a Workshop, February 4, 2016

Do You Have a Vested Interest in End-to-End Trust and Security for the Internet of Things?

Help identify challenges, give your point of view, provide valuable insights, and offer recommendations that will help drive IoT development.

A Call for Technology Leaders and Innovators

IEEE, Internet2, and the National Science Foundation (NSF) as well as a host of other sponsors are working together to gather industry technologists who can help drive the Internet of Things (IoT) conversation and contribute to the development of an open architectural framework.

On Thursday, 4 February 2016, IEEE has organized "IEEE End-to-End Trust and Security for the Internet of Things," a workshop that will be held at George Washington University. Together with our sponsors, we are seeking qualified technology leaders and innovators to participate as presenters and attendees at this invitation-only event.

A Call for Presentations

Industry, government, and academic professionals, including researchers, IT architects, security professionals, government agencies, industry associations, professors, and post-graduate students, are encouraged to develop and submit presentations that express viewpoints, make recommendations, and further the discussion on the subject of end-to-end trust and security for an open IoT architectural framework. Submissions should address the TIPPSS elements: trust, identity, privacy, protection, security, and safety.

The submissions will be reviewed, and the top fifteen selected will be presented at the IoT workshop on 4 February in Washington DC. Submissions that address policy will also be eligible for presentation at the "IEEE Experts in Technology and Policy Forum (ETAP)," which will take place at the same location on the following day.

Proposal Submissions and Your Invitation

Proposals will be accepted for consideration from - Monday, 4 January 2016, until midnight (EST), Friday, 15 January 2016. Further details are pending. If you have any questions, please submit them to the IEEE, via email.

We encourage you to share this information with your colleagues and other experts in end-to-end trust and security and the development of an open architecture for the Internet of Things.

To request your invitation to the "IEEE End-to-End Trust and Security for the Internet of Things" workshop, please complete our online form.

About IEEE Internet Initiative

The IEEE Internet Initiative connects the voice of the technical community to global policymaking for Internet governance, cybersecurity, and privacy to inform debate and decisions, and to help ensure trustworthy technology solutions and best practices. Through the Initiative, IEEE is connecting engineers, scientists, industry leaders, and others engaged in various technology and industry domains globally, with policy experts in order to expand knowledge about technology and its implications and impact on Internet governance issues, and to raise awareness of public policy issues and processes in the global technical community.

For information on how to get involved, please contact us at: internetinitiative@ieee.org

- **Event at the George Washington University Marvin Center in Washington, DC in conjunction with IEEE, NSF, and George Washington University**
  - Followed by IEEE Experts in Technology & Policy (ETAP) event. Final ETAP report available on our Wiki (http://bit.ly/1rpQN6u)
- **150+ participants, 25+ Internet2 Members, 35+ papers presented**
- **Agenda:**
  - Opening panel with participants from the US DoE, IEEE, IIC, NSF, and M2Mi
  - Afternoon breakouts on Access Control & Identity Management; Architectural Framework; Policy & Standards; and Scenarios & Use Cases
  - Focus on TIPPSS: Trust, Identity, Privacy, Protection, Safety & Security
- **Next Steps:**
  - Opportunity for IoT-related education a key theme (E2ET&S, educating future leaders)
  - Internet2 on panel at IEEE conference on Connected Health: Applications, Systems & Engineering Technology (CHASE) event, June 27-29 in Washington, DC (http://bit.ly/1W6x1Wt)

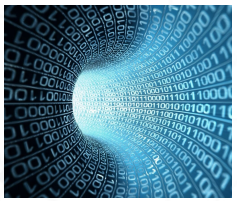
Addressing TIPPSS is essential to achieving safe, secure, scalable future smart city and campus architectures

Trust
Identity
Privacy
Protection
Safety
Security

Identifying a framework for segmenting IoT devices & the potential risks is a first step towards creating a TIPPSS environment

Hacking an IoT device can have implications across multiple fronts:

Trust, Identity, Privacy, Protection, Safety & Security



Data

Physical

Financial

Reputation

IoT Sand-BOX Concept

Internet2 IoT Sand-BOX Program

- **Goal**: Provide cloud-based IoT software development teaching platform to member universities, so that instructors can incorporate a hands-on, cloud-centric approach to IoT in their class curriculum
- Address needs of Internet2 University Members with potential to expand:
  - Other Internet2-connected university and 4 year colleges
  - Community colleges
  - K-12

Welcome to the Internet2 Smart Campus Initiative

- Forum to share learnings and develop new insights and practical recommendations
- Create focused task forces to support collaborative development of practical recommendations
- Guided by a Smart Campus CIO Advisory Council
- First task force: IOT Systems Risk Management Task Force led by Chuck Benson at the University of Washington

CIO Smart Campus Advisory Council Interview Results

Expectations

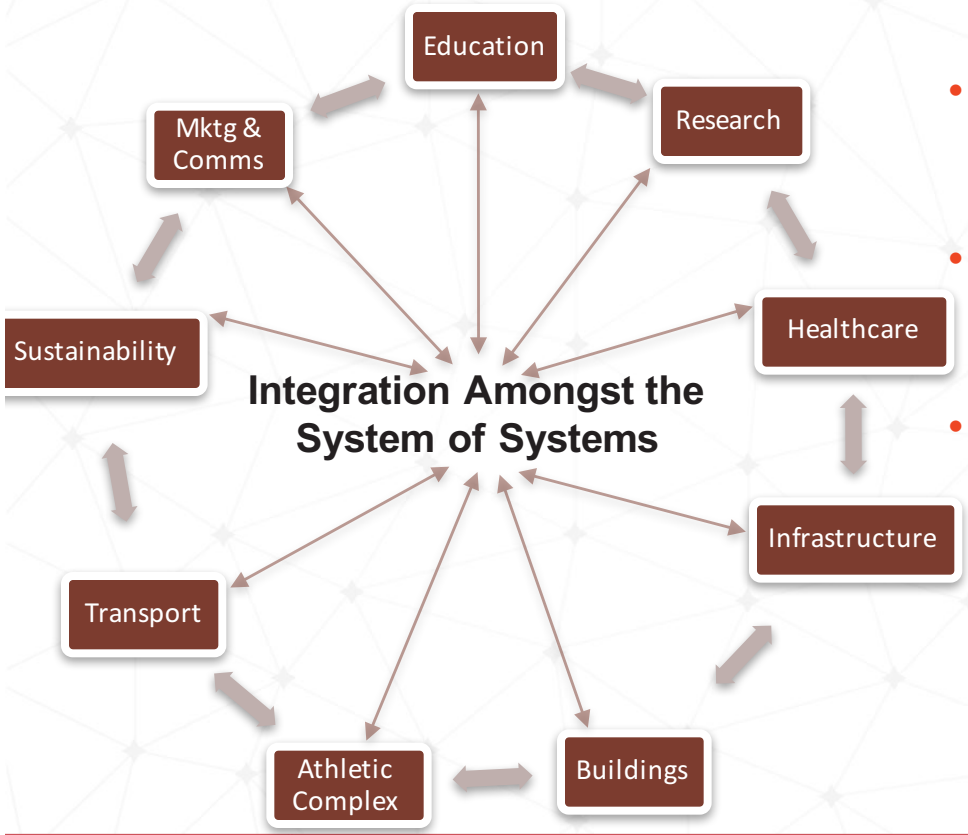
- "Knowledgeable knowledge transfer"
- Technology diffusion
- Stakeholder discussions for longer-term campus planning
- Enable the facilitation of smart campus to extend to a smart community

- **Smart Campus Potential Focal Areas**
  - Student experience & success
  - Facilities/Buildings: lighting, HVAC, etc.
  - Smart stadiums: fan experience & revenues
  - Identify & define common infrastructure standards
  - Security: physical, data, holistic approach
  - Connected vehicles
  - Identify adoption roadblocks
  - Smart Campus 2025: Anticipating future needs
- **Smart Campus Challenges**
  - Managing the data
  - Standards
  - Ethics
  - Infrastructure management
  - Power supply: batteries, PoE
  - Privacy & security
  - Enterprise risk management

Smart Campus Initiative: DRAFT Charter Statement

- Equip Internet2 members with the skills and guidance to effectively deploy Smart Campus capabilities by:
  - Sharing best practices from current Smart Campus projects
  - Engaging campus strategic stakeholders through the CIO to share interest and vision for a Smart Campus
  - Identifying needs and challenges that can be addressed with potential Smart Campus and IoT approaches
  - Providing recommended courses of action that resolve challenges, leveraging best practices

Defining a Smart Campus



- A Smart Campus leverages data to ***improve student success and experience, and campus operations***
- Requires integration of Information Technology and Operational Technology to ***better inform decision making*** in each domain and across the campus
- Achieving a Smart Campus will involve cross-campus collaboration with multiple stakeholder partnerships. These partnerships will include, but not be limited to:
  - Facilities
  - Central IT
  - Campus Security
  - Administration
  - Research Community
  - Faculty & Students

Healthcare and Life Sciences Networking Needs Based on SME Interviews

Description	Area
• Performance monitoring across a collaborative community.	Monitoring
• Easier configuration of federated IdM and authentication.	Authentication
• Guidelines for attribute sharing for federated IdM.	Authentication
• Convenient GUI for high-performance data transport.	Data Transport
• An off-the-shelf integrated data transport platform.	Data Transport
• Resources to help comply with HIPAA and FISMA.	Security
• Science DMZ design patterns for sensitive data.	Security
• Great high-speed connectivity to public cloud resources.	Cloud Computing
• Limited or no public cloud data egress fees.	Cloud Computing
• Access to archival storage in public or private clouds.	Cloud Computing
• Resources to help with IT training for researchers.	Training

Learning more about CINC and CINO

INTERNET2

CHIEF INNOVATION OFFICE

Collaborative Innovation Community

Educating, Inspiring, and Advancing R&E – Together!

The Internet2 Collaborative Innovation Community was established in 2015 after a survey of Internet2 members found that End-to-End Trust and Security, Internet of Things (IoT), and Distributed Big Data and Analytics (DBDA) were top of mind within the community for open collaborative innovation.

Florence Hudson, Internet2's Chief Innovation Officer, recognized that the community sought a collaborative environment to discuss trends and issues that affected R&E and their organizations, and created three new working groups led by the community:

END-TO-END TRUST AND SECURITY

INTERNET OF THINGS

DISTRIBUTED BIG DATA AND ANALYTICS

FOCUS AREAS

END-TO-END TRUST AND SECURITY

The need for increased vigilance and defense in depth of Trust, Identity, Privacy, Protection, Safety and Security (TIPPSS) for people, data and devices is rapidly growing. This group is focused on the evolving needs and tools in an advanced TIPPSS roadmap, from software defined perimeters, to network segmentation, and end-to-end trust and security for IoT.

INTERNET OF THINGS

Advancements in technology and ongoing innovation are ushering in a new era, the Internet of Things. Working with our community on creating best and next practices for establishing smart campus and smart grid test beds, keeps our finger on the pulse of this developing area, as they will be built on a foundation of IoT. Our IoT Sandboxes will make IoT technologies accessible to many community institutions and allow us to begin deeper collaboration in areas important to our community.

DISTRIBUTED BIG DATA AND ANALYTICS

As the world we live in continues its march towards digitization, increasing amounts of data will be produced and analyzed to achieve efficiencies. The DBDA working group is exploring what these data volumes will mean for genomics, smart campus, and digital humanities. Leveraging partnerships, collaborations, and Internet2 capabilities in advanced networking, cloud services, and federated identity will help the community better manage their big data and analytics needs for these focal areas.

A FOUNDATION FOR STRATEGIC INNOVATION

The Internet2 community has the opportunity to be a foundation and catalyst for strategic innovations as our members build the leaders of the future economy and the world.

Internet2's Chief Innovation Office compiled a market view of trends in Information and Communications Technology (ICT) that are of importance to the research and education community. The key trends were determined based on their potential economic value in 2025, their importance and potential for the research and education community, and the large amount of data they will create or utilize that will need to be communicated over various networks.

The Internet of Things, Healthcare and Life Sciences, Smart Cities – and the enabling technologies like cloud computing, cyber security and big data – are just some of the trends that will likely be top of mind for Internet2 community members in 2016 and beyond.

Access information about these trends and help us to better understand how these trends impact you and your institution.

internet2.edu/blogs/detail/9945

JOIN US AND ADD YOUR INSIGHTS TO THE EFFORT!

Innovation working groups are enhanced with your insight and expertise. Together, we can work to educate and inspire leadership, to address current and future challenges, and embrace the many opportunities we see.

Community Members are invited to participate in collaborative opportunities across all three of the Collaborative Innovation Community Working Groups.

Each working group is led by Internet2 member representatives (with support from Internet2 staff), leverages member programs and resources, and encourages participation from the entire Internet2 community. The groups make specific recommendations regarding scope, ensure economic viability and scalability, and clarify value to a significant segment of Internet2's membership.

CONTACT US:

cino@internet2.edu
internet2.edu/vision-initiatives/initiatives/collaborative-innovation-community

CINC Up Webinars

IoT & E2ET&S

- *Software Defined Perimeter*: September 1, 2015
  - Cloud Security Alliance's Junaid Islam outlines how Software Defined Perimeter (SDP) can secure open networks and fend off cyberattacks. Developing the specs for V2. Want to get involved? Contact Junaid Islam jislam@vidder.com
  - Recording and slides available: http://bit.ly/1phYI3M
- *Network Segmentation for IoT*: February 2, 2016
  - Cisco's Paul Forbes Bigbee outlines the use of network segmentation to ensure additional IoT connected devices don't undermine overall network security
  - Recording and slides available: http://bit.ly/1Q2eDcI
- *Cisco Digital Ceiling Project*: March 14, 2016
  - Cisco's Todd Federes shares the vision for the new Digital Ceiling product, enabling the integration of smart lighting, building automation, and IoT technologies over a single converged IP network
  - Recording and slides available: http://bit.ly/26ZHjiy

CINC Up Webinars

DBDA

- *NSF Big Data Hubs*: April 1, 2016
  - Renata Rawlings-Goss (South Big Data Regional Innovation Hub) and Rene Baston (Northeast Big Data Regional Innovation Hub) share their vision for the Big Data Regional Innovation Hubs and how members can participate going forward
  - Recording and slides available: http://bit.ly/1Yz67rN

Save the date! CINC Up Call on **Monday, June 6 at 2PM ET**. Topic: OpenFog Consortium presented by Mung Chiang, Princeton University and OpenFog Consortium Board Member

Campus / Community Collaborative Innovation Days

- **Goal: Increase university/community collaboration and partnerships, with researchers, IT, networking and community, leveraging broadband connectivity for community value**

- **Suggested Campus/Community Collaborative Innovation Days Themes and Discussions:**
  Innovation Initiatives
  - Key ICT Trends for Research & Education
  - Internet of Things
  - End-to-End Trust & Security
  - Distributed Big Data & Analytics
  - Smart Campus / Smart City
  - Healthcare/Life Sciences including Internet of Medical Things
  - Network Services
  - Digital Humanities
  - Researcher Engagement
  - Researcher Transition to Practice
  - Gender Diversity Initiatives
  - Broadband connectivity and collaboration

- **Participants:**
  - Regional community engagement contacts, Regional Optical Network (RON) that serves university, Internet2 division representatives, community anchor institutions, local government
  - Campus participants could include students, researchers, IT departments, Vice President of Research, Deans, Facilities group, Public Safety

developing innovation with impact

Annabel Grant
Open Call Coordinator/ Senior Business Development Officer, GÉANT

Global Summit, Chicago

15th May 2016

What I'll be covering today

- a brief introduction to the GÉANT project and network

- using the **existing GÉANT community** (Task forces) for innovation development

- **opening up and widening the GÉANT community** (Open Call programme) for innovation development…..outside of the "traditional" GÉANT box

What is GÉANT?

GÉANT is the leading collaboration on e-infrastructure and services for research and education in Europe

- **GÉANT means community collaboration and is built on networks, services, people and innovation.** We develop, deliver and promote advanced networks and associated e-infrastructure services. We support open innovation, collaboration and knowledge-sharing amongst our members, partners and the wider research and education networking community.
- We serve the research and education networking community in Europe, helping them to deliver innovative networks, technologies and services for research and education.

GÉANT: e-Infrastructure for the data deluge + a very large and complex EC funded project

500Gbps super-channels

1,000+ terabytes of data across network per day

50,000 km network infrastructure on 44 routes

Widely diversified footprint

- 50 million users
- 10,000 institutions
- 43 countries in Europe
- access to 100+ countries worldwide

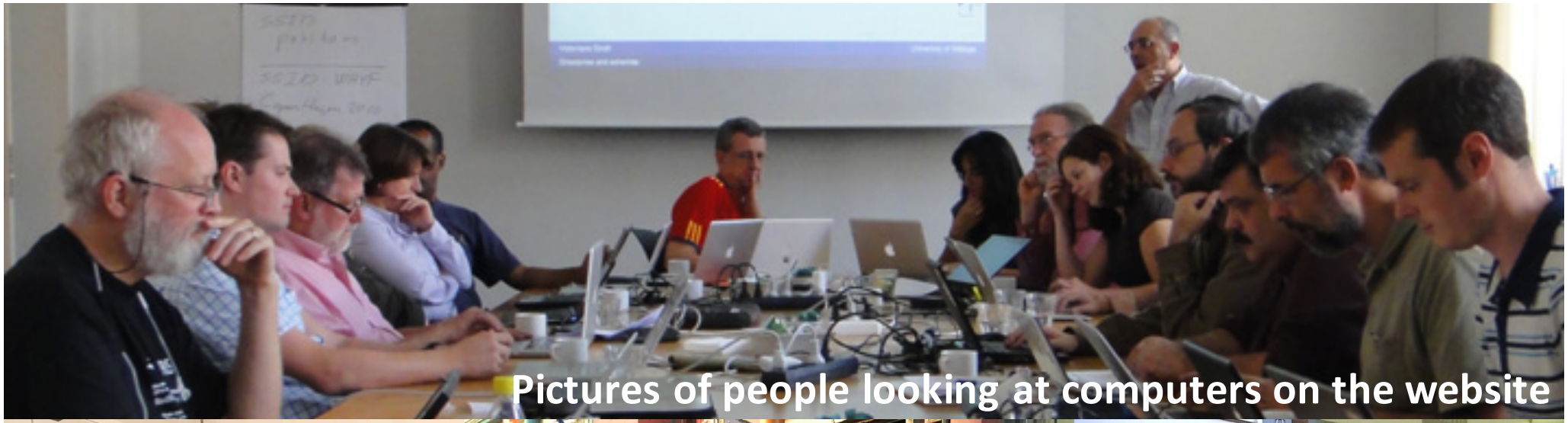
- Not just a network…. wide range of innovative services including IPv6, authentication, bandwidth on demand, security, clouds
- GÉANT is co-funded by Europe's NRENs and the European Commission (EC)
- 41 project partners across Europe, €100m project started 1 May, 5371PMs with over 250+ project participants
- Reduced research efforts increased service innovation

Bearing in mind the size and complexity of GÉANT – how do we stimulate innovation?

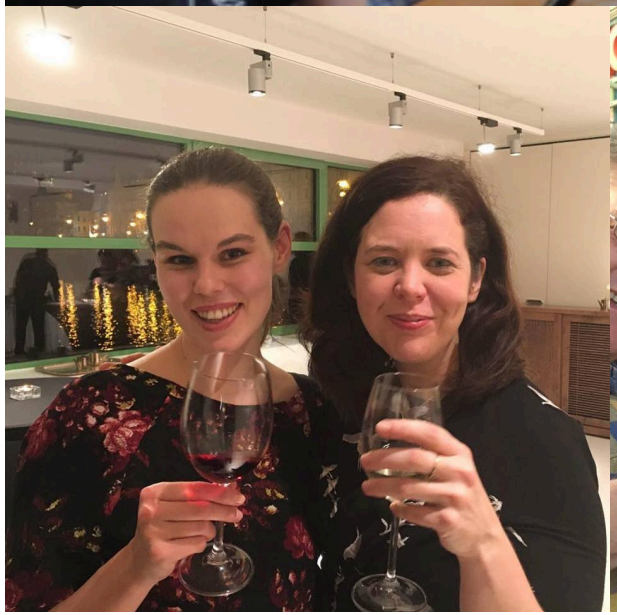
Using expertise within the existing GÉANT community (Task forces)

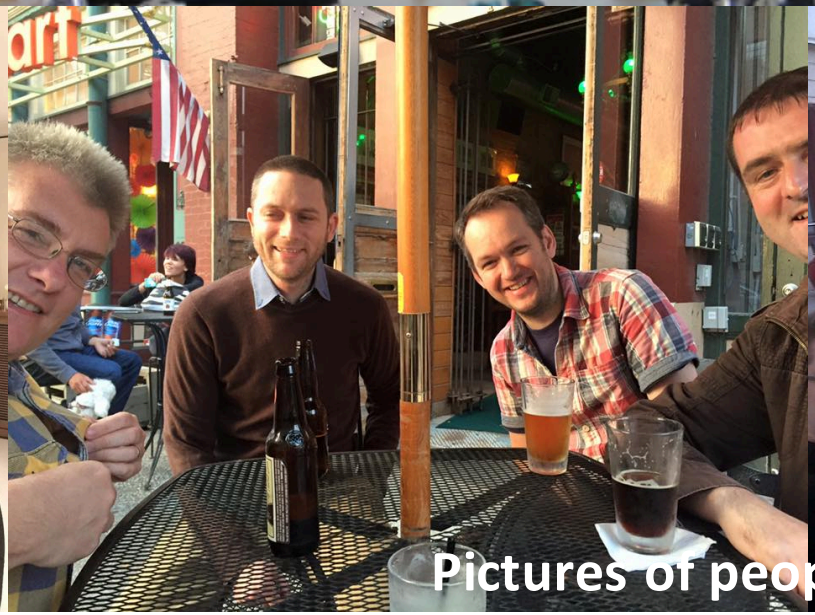
- Task Forces are made up of groups of experts who undertake joint work in their common areas of interest
- Each task force has agreed terms of reference and objectives
- In principle, participation in task forces is open to any individual who can offer appropriate expertise, manpower, equipment or services.

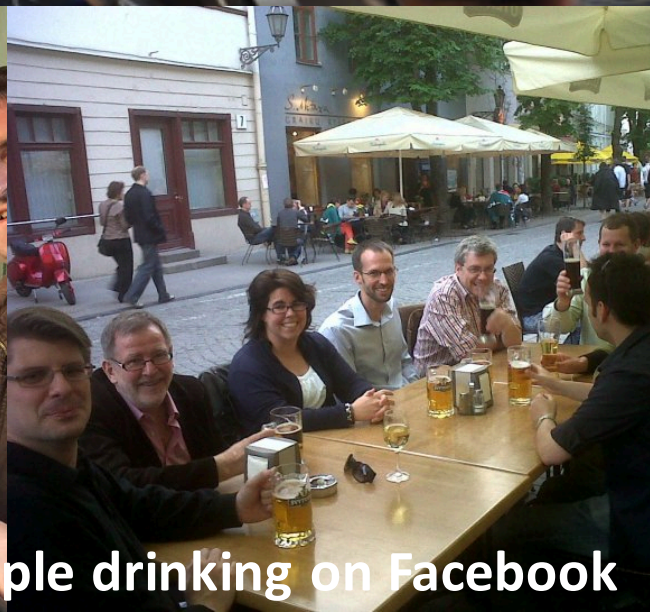

So.. what have the Task Forces ever done for us?
(apologies to Monty Python)



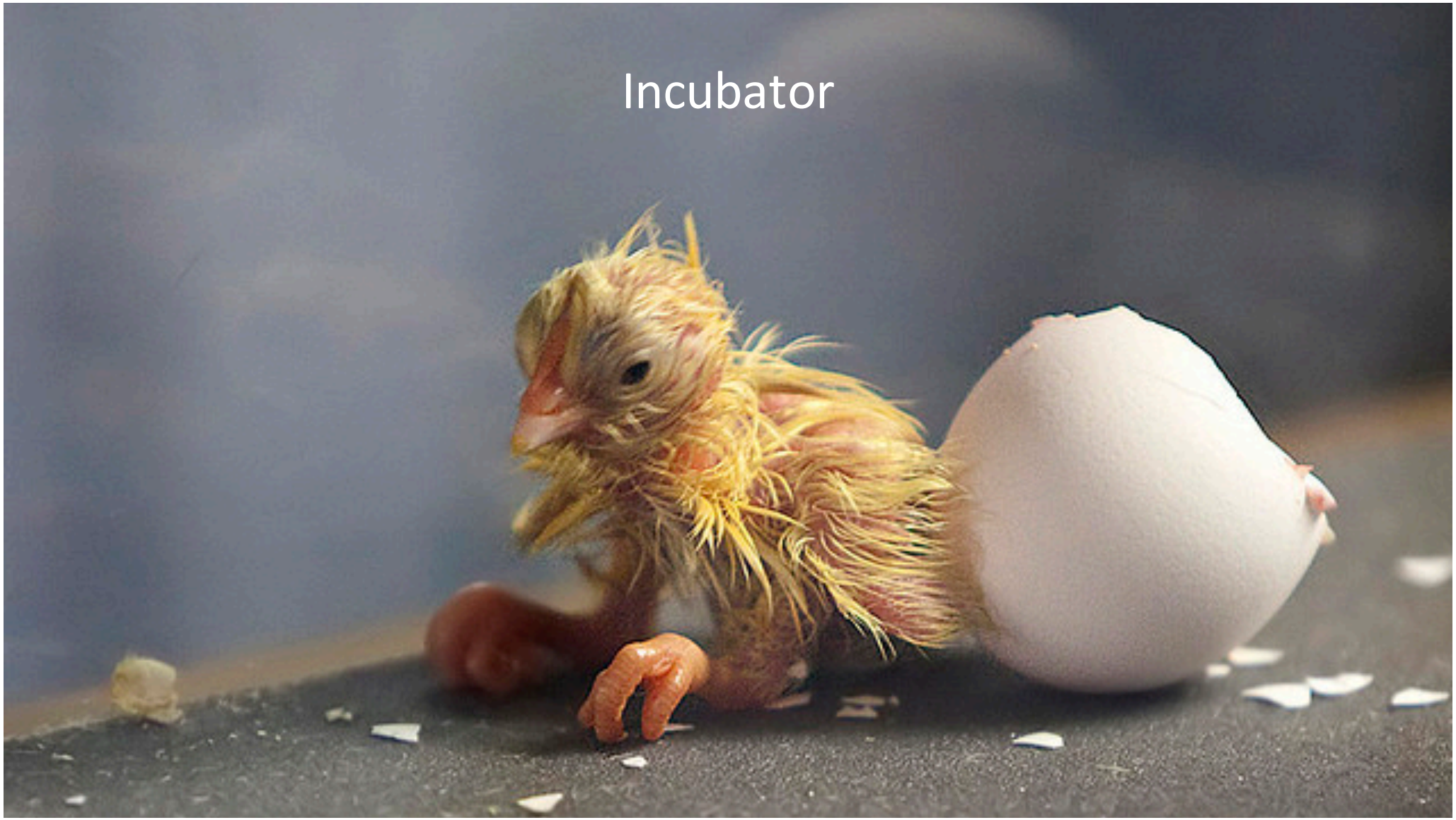
Pictures of people looking at computers on the website







Pictures of people drinking on Facebook

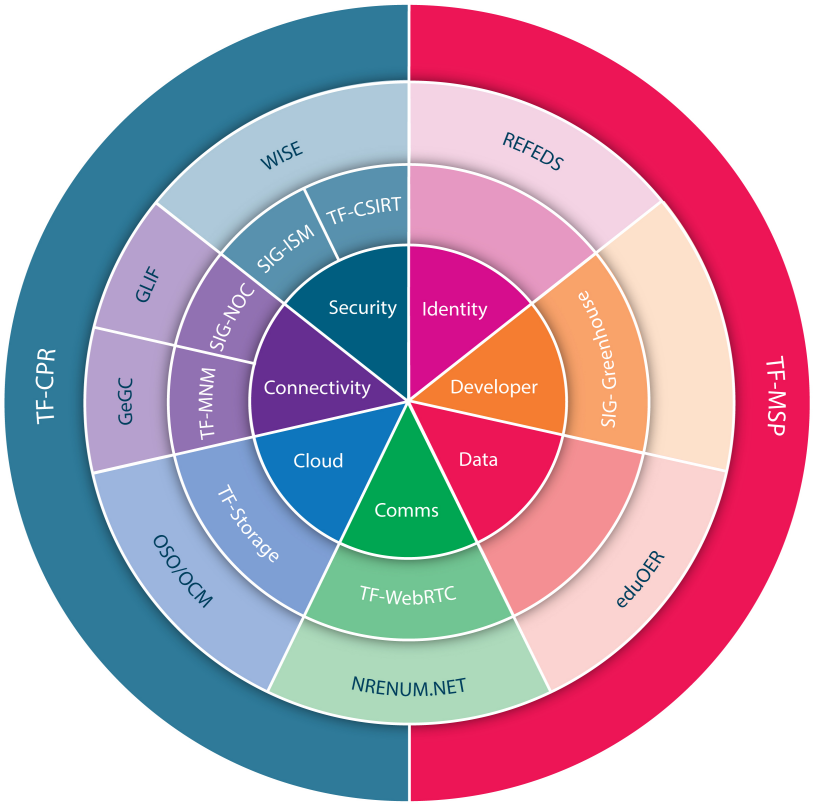

Incubator

Sharing ideas….

"large-group face-to-face meetings and events are the best option when a business or organization needs to **capture attention** necessary for a new or different strategy, relationship or product. It is the best option for **inspiring people** and building a **positive emotional climate** that influences decision-making and performance at every level. It is the best option for building strong relationships and community that are powerful, informal levers for success in our post-recession business world. Finally, face-to-face is the only option for **celebration** and **recognition rituals** that enliven the human spirit and shape the cultural norms of the organization."

http://www.themaritzinstitute.com/perspectives/~/media/files/maritzinstitute/white-papers/the-case-for-face-to-face-meetings-the-maritz-institute.pdf

Stimulating innovation: how does it all work? (attention acronym overload!)



Current Task Force/Special interest groups Portfolio (+ Special Projects)

- Small amount of manpower per group (secretariat function) + some travel for chairs
- Volunteers
- 30 – 180 attendees per meeting
- Oversight by GÉANT Community Committee

outstanding example of “well established” TF activity

TF-CSIRT

- Computer Incident Response Teams
- Web of Trust
- Confidentiality, Large Closed Community
- Collaboration with FIRST

- Software Development (RTIR)

- Training (TRANSITS)

- Accreditation (Trusted Introducer)

TRANSITS

Global Reach

TF-CSIRT
Trusted Introducer

> 120 CERTs Accredited

TF-CSIRT Timeline

1990
- The very first CERT in Europe was established by the French Space Physics Analysis Network (SPAN)

1993
- RARE CERT Task Force investigated but not implemented.

1995 - 1999
- TERENA Security Incident Response Coordination for Europe (SIRCE).

1999
- CERT-coordination

2000
- 1st TF-CSIRT meeting, Trusted Introducer established

“new” TF activity….

TF-WebRTC

- Large-scale, real-time communication
- Mixed media sources
- Bridging to legacy VC/VoIP systems

First Meeting – December 2014

- 51 participants (34 in person & 17 remote)

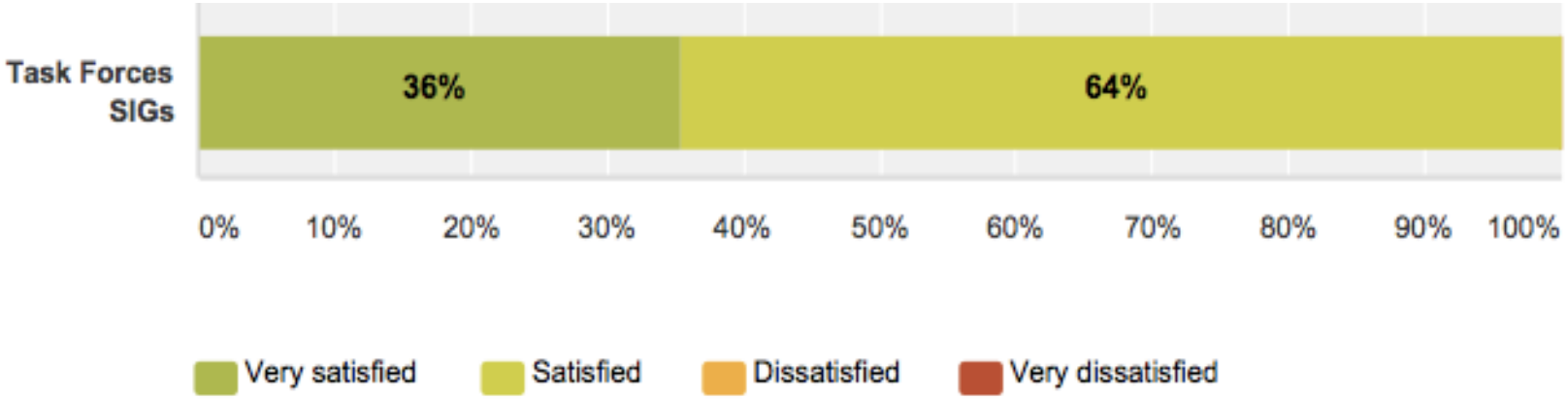
Huge industry interest, including:

- Jitsi, Pexip, Kurento, Vidyo, Ericsson, Telefónica, Apple, Oracle

https://wiki.geant.org/display/WRTC/TF-WebRTC+Task+Force+on+WebRTC

TF Science Engagement and WISE forum: share experiences/best practices

What do our NRENs think?



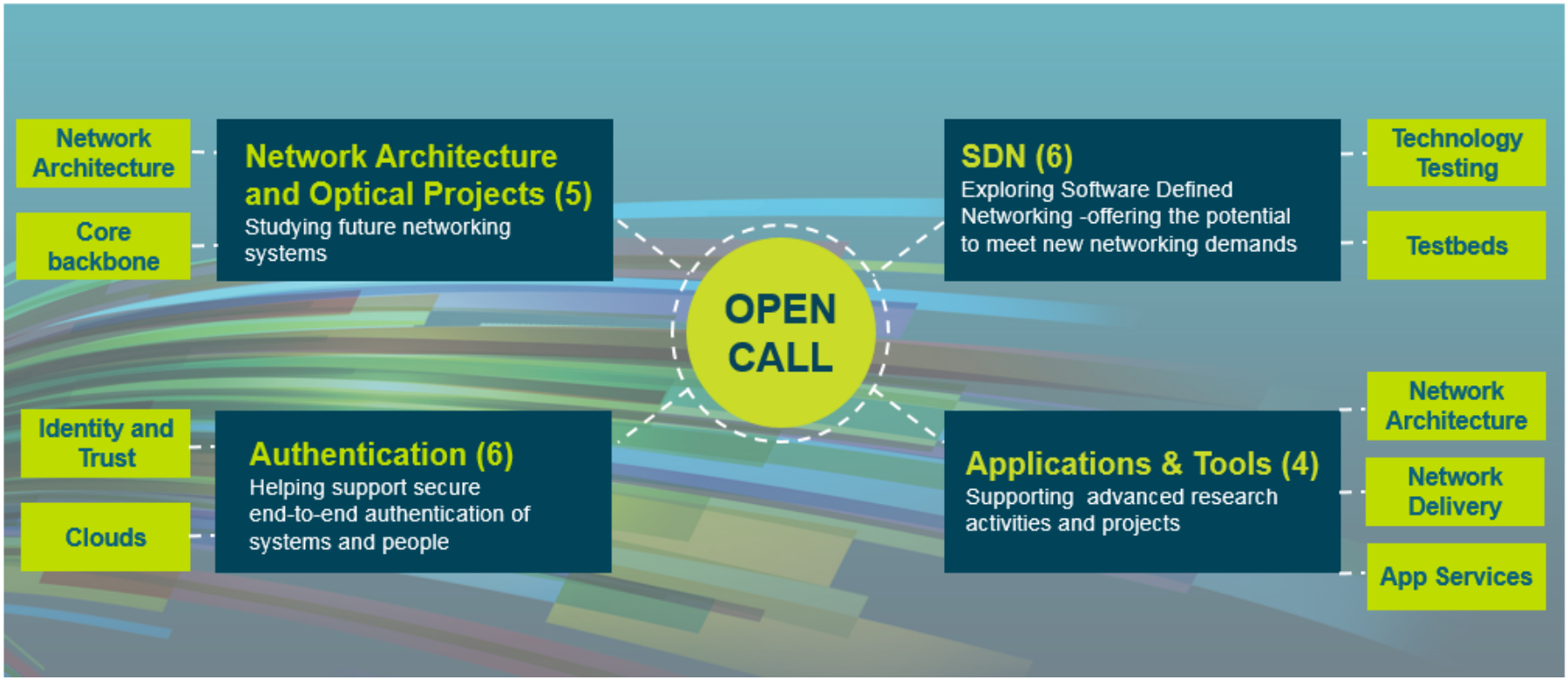
Bearing in mind the size and complexity – how do we stimulate innovation?

Open Call programme - using expertise outside of the existing GÉANT community

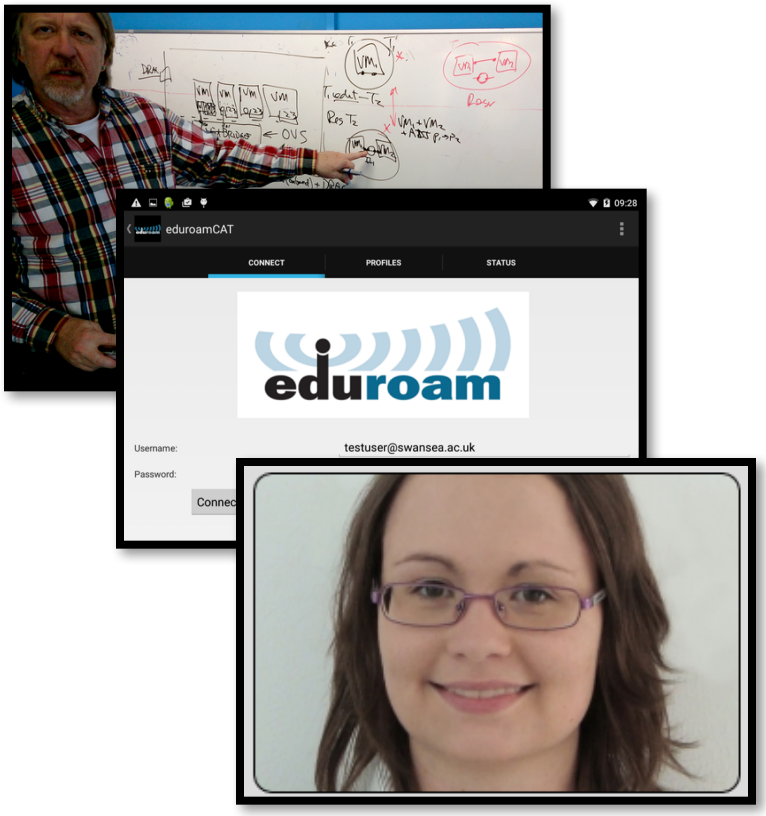
- method for openly selecting new partners (competition) to work with GÉANT following strict EC rules
- €3.3m ($3.7m) of GÉANT R&D budget "ring fenced" for Open Call programme
  - 21 projects with 18 month duration (October 2013-March 2015)…. 2-4 partners per project
  - 37 beneficiaries most universities/RI but also commercial organisations of which **30 NEW partners**
  - Average EC contribution per project €100-€350k

Why did we do it? *Using new expertise to keep GÉANT services world class*

Open call programme – focused innovation



new partners = tangible results/sustained impact for *GÉANT*



Majority of test bed users continue working with GÉANT

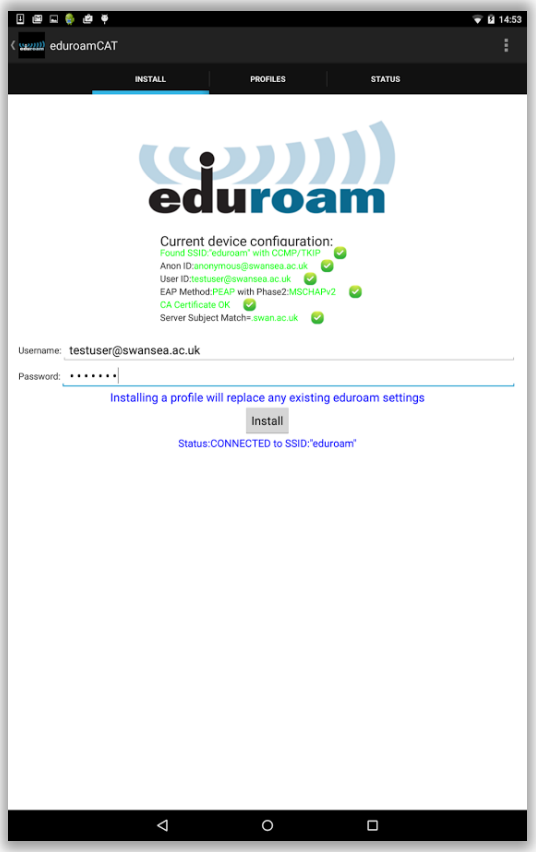
New android CAT tool developed and now being used in GÉANT . The total installs of the app is 42k+ and rising. Overall 350k user downloads of CAT configuration profiles (developed within SENSE project)

Another new GÉANT task leader (Leibniz Supercomputing centre)

Examples of Projects

SENSE (from TRUST & ID area)

- **SENSE** = **S**ecure **E**nterprise **N**etworks finally **S**imple and **E**asy
- Partners: PSNC & RESTENA
- Greatly improve **enterprise WIFI authentication** landscape
- Make EAP protocol supplicants more secure, user friendly & feature rich
- Multi-platform config file format for EAP parameters – 2 versions of an IETF Internet draft (XML & Yang)
- Defined **metrics for assessment** of supplicants
- **EAPlab** - toolkit including conformance testing
- Written & published 2 supplicants – **Android** & **Linux**
- Latest supplicant (post SENSE, but same people) is for **OS X El Capitan**

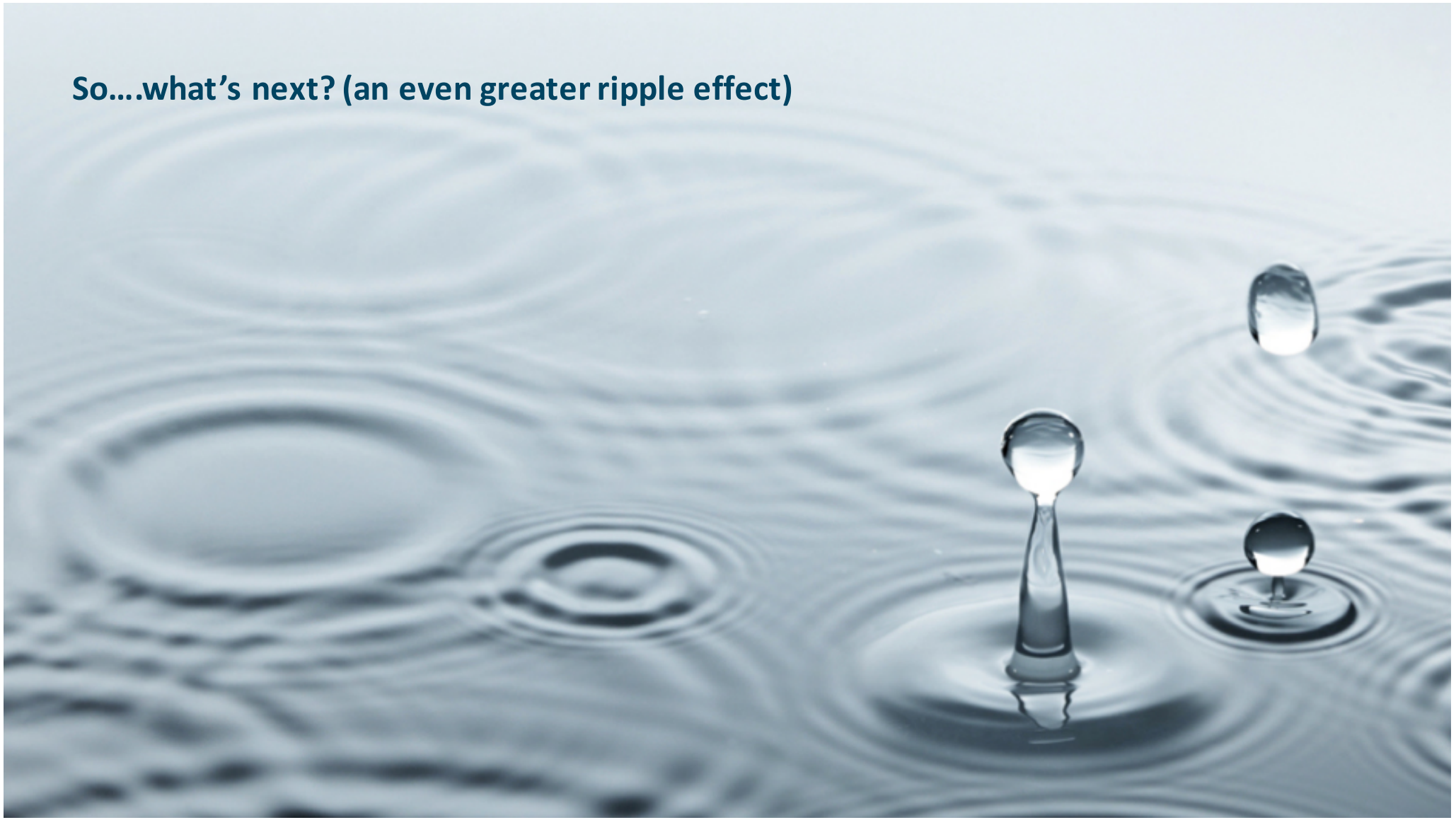


Benefits: global awareness raising

100+ events, 40+ scientific papers, 3 IETF drafts, 2 NSI standards

Conclusion: Open Call programme is delivering lasting benefits (75% continue to work with us)

So….what's next? (an even greater ripple effect)



moving to a totally new collaborative working environment

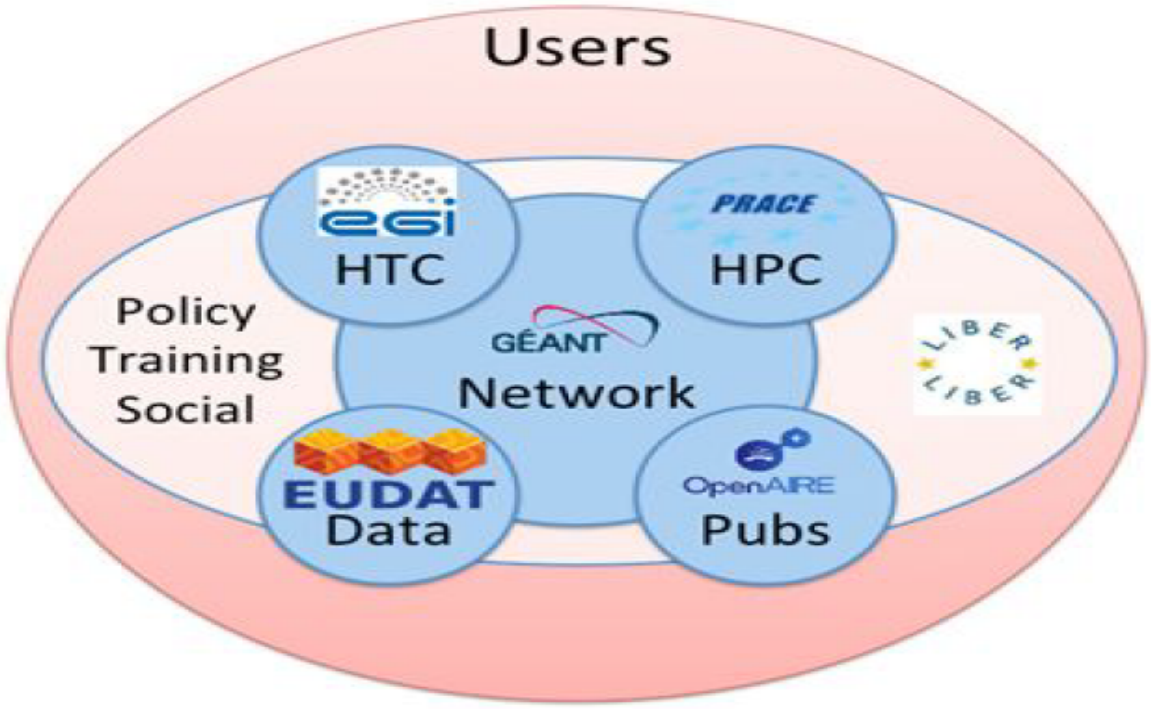
harnessing joint/collaborative benefits of e-infrastructures

Partners: **Innovalia (coordinator) GÉANT; EGI; OpeAIRE; EUDAT; PRACE; Cap Digital; CARSA; Digit Catapult; Digital SME alliance**

Budget: **ca. €6m**

AIM: To run an joint e-infrastructure Open Call programme focused on SMEs.

- Increase number of SMEs using e-infrastructures
- Increase number of SMEs as providers of services to e-infrastructures i.e. developmen of e-infrastructure services.



foreseen impact

- Stimulate the innovation potential of innovative actors, SMEs in particular, either as suppliers of technologies and services for e-infrastructures or as users of e-infrastructures to improve their own product and service offering.
- Increase the number of SMEs that are aware of available e-infrastructures resources and services and become active innovators as users and or suppliers of e-infrastructures.
- Stronger links between e-infrastructure operators and other actors in the innovation chain, such as independent software vendors, innovation clusters and Research and Technology Organisations (RTOs), will be put in place.
- The value of existing scientific information infrastructures will increase with the addition of new interoperable and/or integrated services.
- Make European and global intellectual capital available to researchers, business and citizens. This will support scientific advances now and generate innovation with economic impact

Some final thoughts….

- use ALL expertise available both inside and outside "traditional" R&E communities
- encourage continued and increased US (and global) participation in current and future collaborative activities
- benefits of collaborative innovation are clear – so let's do all we can to bring the transformational benefits to the R&E community
  http://www3.weforum.org/docs/WEF_Collaborative_Innovation_report_2015.pdf
- brief snapshot – more information http://www.geant.org/Innovation/Pages/Home.aspx